FCS22 – Monitoring of Temperatures, Humidity, Refrigerators, and Freezers

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1. Scope

1.1. This procedure outlines the quality control (QC) measures instituted for temperature and/or humidity regulated equipment and environment as well as sensors used in the laboratory.

2. Background

2.1. The Forensic Chemistry Unit (FCU), operates several temperature and humidity control systems to hold or process samples and reagents that may be temperature-sensitive. To ensure proper storage and processing of items, refrigerators, freezers, and environments are electronically monitored by the building-wide temperature monitoring system (i.e. TempGenius or equivalent).

3. Safety

3.1. Wear personal protective equipment (e.g., lab coat, gloves, mask, eye protection), when carrying out standard operating procedures (SOPs).

3.2. Read Material Safety Data Sheets to determine the safety hazards for chemicals and reagents used in the SOPs.

4. Materials Required

4.1. National Institute of Standards and Technology (NIST) traceable thermometers

4.2. Refrigerators and freezers

4.3. Temperature and/or humidity monitoring system (i.e. TempGenius or equivalent)

5. Standards and Controls

5.1. Not Applicable

6. Calibration

6.1. All in use monitoring system sensors shall be calibrated annually (i.e. once per calendar year) by an accredited vendor using NIST traceable standards. All certificates shall be maintained.

6.2. All in use digital sensors shall be calibrated by an accredited vendor as per manufacturer recommendations (or annually, if unavailable) using NIST traceable standards. All certificates shall be maintained.

7. Procedures

7.1. Humidity and Temperature Recording for Rooms, Refrigerators, and Freezers

7.1.1. Temperatures for refrigerators and freezers as well as both temperatures and humidity for rooms are monitored and recorded hourly by a temperature monitoring system.

7.1.1.1. Acceptable range values for units and rooms will be established individually, based on recommended storage conditions for contents or optimal environmental conditions for procedures, as applicable.

7.1.1.2. If a reading is outside of the acceptable range, the Technical Lead, and/or designee will be alerted.

7.1.1.3. The readings, as well as any out-of-range alerts and action(s) taken to address the alerts (by the appropriate FCU personnel), shall be captured in a maintained log.

7.1.1.4. Note: All sensors employed by the TempGenius Temperature Sensor monitoring system within FCU may not need to be regularly recorded, e.g. non-vital area room sensors. Only processes or environments that have a direct impact on the integrity of a sample or the analysis thereof requires regular monitoring. A climate-controlled environment generally provides sufficient conditions for testing.

7.1.2. Alternatively, refrigerator, freezer, and room temperatures and humidity may be checked manually (by FCU personnel) using digital stand-alone sensors (NIST traceable) and recorded at least once per business day, when possible.

7.1.2.1. Readings, along with any out-of-range actions, shall be recorded in a Manual Temperature and Humidity Monitoring Log (Document Control Number 35192), and logs maintained.

7.1.2.2. Minimum/maximum readings should be cleared each time a reading is recorded.

7.1.2.3. For weekends, holidays, or other days which an individual temperature cannot be recorded, a minimum/maximum range shall be recorded for that time frame.

7.1.3. Monthly temperature and humidity logs (for either monitoring system or manual recordings) shall be reviewed and signed after the end of each month by the Technical Lead or designee. Records shall be maintained.

7.1.4. If a reading is outside of the acceptable range, a second reading should be checked and recorded during that day. If the second reading is still out-of-range, FCU personnel shall determine whether the issue is due to the sensor or equipment/room. An alternate sensor may be used to verify the reading.

7.1.4.1. If the issue is due to a sensor problem, contact the vendor and replace the malfunctioning sensor with another calibrated sensor.

7.1.4.2. If the issue is due to the refrigerator/freezer unit, maintenance may need to be performed according to the manufacturer's user manual or a service call may need to be placed with an outside contractor. Any maintenance procedures performed shall be noted in the corresponding log, if applicable.

7.1.4.3. Unless the unit needs to be placed out of service and contents transferred, if a refrigerator/freezer is not maintaining the proper temperature due to malfunction or a power outage, do not open it. This will prevent the cold air from escaping and increasing the temperature even further.

7.1.4.4. If the issue is due to an environmental change in humidity or temperature, building services may need to be contacted in order to adjust the environmental conditions. Factors will be considered on a case-by-case basis to determine whether testing should be discontinued while values are out of range.

7.2. Activating and Maintaining In-Use Refrigeration Units

7.2.1. All new or previously out of service units must undergo a performance verification prior to being placed in service.

7.2.1.1. A performance verification shall consist of a five-hour minimum monitoring of temperatures within the established acceptable range, with at least one recording per hour.

7.2.1.2. Temperature recordings shall be checked using either a calibrated NIST-traceable thermometer or calibrated temperature monitoring system sensor.

7.2.1.3. Readings shall be captured in a monitoring system log or recorded in a Manual Temperature and Humidity Monitoring Log (Document Control Number 35192).

7.2.2. All in use refrigeration units must undergo annual (i.e., once per calendar year) preventative maintenance service by an approved external vendor.

7.3. Thermometers and Sensors

7.3.1. All in use monitoring system sensors shall be calibrated annually (i.e. once per calendar year) by an accredited vendor using NIST traceable standards. All certificates shall be maintained.

7.3.2. All in use digital sensors shall be calibrated by an accredited vendor as per manufacturer recommendations (or annually, if unavailable) using NIST traceable standards. All certificates shall be maintained.

8. Sampling

8.1. Not applicable

9. Calculations

9.1. Not applicable

10. Uncertainty of Measurement

10.1. Not Applicable

11. Limitations

11.1. Not Applicable

12. Documentation

12.1. Calibration certificates
12.2. Manual Temperature and Humidity Monitoring Log (Document Control Number 35192)
12.3. Monthly Temperature and Humidity Logs

13. References

13.1. Forensic Science Laboratory Quality Assurance Manual (Current version)
13.2. FSL Departmental Operations Manuals (Current versions)
13.3. FSL Laboratory Operations Manuals (Current versions)